Multispectral Solutions, Inc.
Sirius Satellite Radio Inc.
XM Radio Inc.

February 7, 2002

Via Electronic Filing
Mr. William F. Caton
Acting Secretary
Federal Communications Commission
445 12th Street, NW
Washington, DC 20554

RE: ET Docket No. 98-153 – Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems

Dear Mr. Caton:

This letter is filed jointly on behalf of Sirius Satellite Radio Inc. ("Sirius") and XM Radio Inc. ("XM"), licensees of satellite Digital Audio Radio Service ("SDARS") systems in the 2320 – 2345 MHz band,[1] and Multispectral Solutions, Inc. ("MSSI"), a developer of Ultra-wideband ("UWB") technology.

In September 1998, the Commission issued a Notice of Inquiry ("NOI") to assess the possibility of authorizing UWB devices on an unlicensed basis under Part 15 of the Commission's rules.[2] In the NOI, the Commission noted that UWB devices may emit energy into restricted frequency bands, which is prohibited under Part 15, because "[i]t is difficult to avoid operating in these bands as the ultra-wide bandwidth is intrinsic to the operation of UWB equipment."[3]

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[1]Sirius and XM were the winning bidders in the DARS licensing auction in April 1997, together committing nearly $170 million to the U.S. Treasury. In October 1997, the Commission licensed Sirius and XM to provide DARS in the United States. *See* Satellite CD Radio, 13 FCC Rcd 7971 (Int'l Bur., 1997); American Mobile Radio Corporation, 13 FCC Rcd 8829 (Int'l Bur., 1997). Sirius is licensed to provide service in the 2320 – 2332.5 MHz band. XM is licensed to provide service in the 2332.5 – 2345 MHz band.

[2]*See* Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, *Notice of Inquiry*, ET Docket No. 98-153 (Sept. 1, 1998).

[3]*Id.* at ¶ 5.

In May 2000, the Commission issued a Notice of Proposed Rulemaking ("NPRM") proposing to authorize UWB under Part 15.[4] In the NPRM, the Commission noted that, in response to the NOI, "[m]ost of the commenting parties agree[d] that the majority of UWB systems cannot avoid transmitting within the restricted bands."[5] With respect to the proposal that filters be used to avoid operating in restricted bands, the Commission noted that several commenters opposed such an approach.[6]

Sirius and XM have opposed the Commission's proposal to authorize UWB devices without appropriate safeguards because of concern that such devices will cause harmful interference to sensitive SDARS receivers operating in the 2320 – 2345 MHz band.

Recently, Sirius and XM initiated discussions with MSSI and XtremeSpectrum, Inc. ("Xtreme"), another developer of UWB technology, in an effort to understand more about UWB technology and to explore whether SDARS and UWB can coexist. Throughout the UWB rulemaking, some proponents have been stating that UWB is unique, UWB devices must be able to operate from direct current ("DC") to light, and UWB devices are incapable of being regulated in the frequency domain, such as with band limits and limits on out-of-band emissions into specific frequency bands.

Discussions have demonstrated that these premises are false and that UWB developers can restrict their operations to certain frequencies with little additional cost, thereby avoiding restricted bands. XtremeSpectum and MSSI have stated on the record their support for a proposal made by the Department of Defense that would restrict intentional emissions from UWB devices to frequencies above 4.2 GHz.[7]

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[4] *See* Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, *Notice of Proposed Rulemaking*, ET Docket No. 98-153 (May 10, 2000).

[5] *Id*. at ¶ 23.

[6] *Id*. ("As stated by Time Domain, the addition of filters to notch out portions of the transmitted spectrum would result in higher cost and would disperse the waveform over time due to complex ringing modes of the filter tuned circuits. Time Domain adds that the requirement to use notch filters would render UWB infeasible by decreasing the signal to noise ratio, reducing available processing gain, decreasing ranging and positioning capability and removing multipath immunity and jamming resistance.").

[7] *See* Letter from Michele Farquhar, Counsel for XtremeSpectrum, Inc., to Ms. Magalie Roman Salas, FCC, ET Docket No. 98-153 (January 28, 2002); Letter from Dr. Robert J. Fontana, Multispectral Solutions, Inc. to Ms. Magalie Roman Salas, FCC, ET Docket No. 98-153 (January 25, 2002).

XM and Sirius support this proposal as well, provided that out-of-band emissions from UWB devices into the 2320-2345 MHz band are limited to no more than 8.6 uV/m @ 3 meters measured in a 1 MHz bandwidth.[8] MSSI supports this proposed out-of-band emissions limit to protect SDARS receivers as well.

The acknowledgment from credible elements of the UWB community that UWB devices can be regulated based on frequency allows the Commission to impose restrictions on UWB devices to ensure that they do not interfere with licensed services in violation of the Commission's rules.[9]

First, the Commission can restrict UWB devices from operating in certain frequency bands to protect sensitive licensed services from harmful interference. For example, SDARS licensees are somewhat more susceptible to out-of-band interference from unlicensed devices than many other licensees. The downlink signal power available to an SDARS receiver is much lower than terrestrial-based communications systems, thereby requiring very sensitive SDARS receivers. In addition, because SDARS receivers operate in a mobile environment, they use omnidirectional antennas that eliminate the ability to "point" an antenna away from a source of interference. Also, SDARS is a broadcast service, presently in operation, from which consumers demand extremely high-quality service. With a digital broadcast system, the loss of an adequate signal can produce a total loss of audio. While people using mobile phones have accepted the fact that intermittent outages or bursts of noise occur during the course of a conversation, intermittent outages or bursts of noise will not be tolerated by an SDARS subscriber who is paying for uninterrupted, high-quality digital radio. For these reasons, SDARS receivers are susceptible to interference. Sirius, XM, and MSSI all support a Commission rule that would restrict UWB devices from operating in the SDARS band to protect these operations.[10] To do so, the undersigned recommend that the Commission restrict intentional emissions from UWB devices to frequencies above 4.2 GHz. Because MSSI has demonstrated that such a frequency cut-off is technically feasible, there is no reason why other UWB developers cannot similarly restrict their operations.

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[8] *See* Sirius Satellite Radio Inc., Petition for Rulemaking (filed Jan. 23, 2002).

[9] Part 15 of the Commission's rules establishes an absolute obligation for operators of unlicensed devices to avoid causing harmful interference to licensed services. 47 C.F.R. § 15.5(b). For example, the Commission recently stated that "the most basic principle of Part 15 operation is the requirement to function in a non-interfering manner in the midst of licensed devices." Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices, *First Report and Order*, 15 FCC Rcd 16244, ¶ 25 (August 31, 2000).

[10] XtremeSpectrum has also agreed that UWB devices should operate only above 4.2 GHz. *See* Letter from Michele Farquhar, Counsel for XtremeSpectrum, Inc., to Ms. Magalie Roman Salas, FCC, ET Docket No. 98-153 (January 28, 2002).

Second, the Commission can impose power and emissions limits on UWB devices that differ based on frequency band. These limits may be more stringent for emissions into bands where sensitive satellite services (such as SDARS) operate than for other frequency bands. For unlicensed devices such as UWB, Sirius, XM, and MSSI advocate an out-of-band emissions limit into the 2320-2345 MHz band of 8.6 uV/m @ 3 meters measured in a 1 MHz bandwidth.

Conclusion

UWB devices can be regulated in the frequency domain. By regulating UWB devices based on the frequencies in which they operate, the Commission can ensure that UWB devices do not interfere with licensed services in violation of the Commission's rules. Sirius and XM do not oppose UWB provided that the Commission requires UWB devices (i) to restrict intentional emissions to above 4.2 GHz; and (ii) to meet an out-of-band emissions limit into the 2320-2345 MHz band of 8.6 uV/m @ 3 meters.

Please contact the undersigned should you require any further information regarding this matter.

Very truly yours,

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